PC-CARD-DAS16/12AO

16 Analog Inputs, 12-bit A/D Resolution, Dual 12-bit Analog Outputs, Four Digital I/O

User's Guide

MEASUREMENT COMPUTING

PC-CARD-DAS16/12AO

Analog I/O and Digital I/O Board

User's Guide

MEASUREMENT COMPUTING™

Document Revision 1, April, 2007

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Table of Contents

About this User's Guide

What you will learn from this user's guide

This user's guide explains how to install, configure, and use the PC-CARD-DAS16/12AO so that you get the most out of its analog I/O, digital I/O and counter features. This user's guide also refers you to related documents available on our web site, and to technical support resources.

Conventions in this user's guide

The following conventions are used in this manual to convey special information:

For more information on …

Text presented in a box signifies additional information and helpful hints related to the subject matter you are reading.

Caution! Shaded caution statements present information to help you avoid injuring yourself and others, damaging your hardware, or losing your data.

<#:#> Angle brackets that enclose numbers separated by a colon signify a range of numbers, such as those assigned to registers, bit settings, etc.

bold text **Bold** text is used for the names of objects on the screen, such as buttons, text boxes, and check boxes. For example:

1. Insert the disk or CD and click the **OK** button.

italic text *Italic* text is used for the names of manuals and help topic titles, and to emphasize a word or phrase. For example:

The *Insta*Cal installation procedure is explained in the *Quick Start Guide*.

Never touch the exposed pins or circuit connections on the board.

Where to find more information

The following electronic documents provide information relevant to the operation of the PC-CARD-DAS16/12AO.

- MCC's *Specifications: PC-CARD-DAS16/12AO* (the PDF version of the *Specifications* chapter in this guide) is available on our web site at www.mccdaq.com/pdfs/PC-CARD-DAS16-12AO.pdf.
- MCC's *Quick Start Guide* is available on our web site at www.mccdaq.com/PDFmanuals/DAQ-Software-Quick-Start.pdf.
- MCC's *Guide to Signal Connections* is available on our web site at www.mccdaq.com/signals/signals.pdf.
- MCC's *Universal Library User's Guide* is available on our web site at www.mccdaq.com/PDFmanuals/sm-ul-user-guide.pdf.
- MCC's *Universal Library Function Reference* is available on our web site at www.mccdaq.com/PDFmanuals/sm-ul-functions.pdf.
- MCC's *Universal Library for LabVIEW™ User's Guide* is available on our web site at www.mccdaq.com/PDFmanuals/SM-UL-LabVIEW.pdf.

PC-CARD-DAS16/12AO User's Guide (this document) is also available on our web site at www.mccdaq.com/PDFmanuals/PC-CARD-DAS16-12AO.pdf.

Introducing the PC-CARD-DAS16/12AO

Overview: PC-CARD-DAS16/12AO features

The PC-CARD-DAS16/12AO is a data acquisition and control board for IBM PC compatible computers with PCMCIA type II slots. The PC-CARD-DAS16/12AO provides 16 single-ended or 8 differential analog inputs, 12-bit A/D resolution, two analog outputs, four digital I/O lines, and three 16-bit down counters.

The analog input range is fully programmable in one of four bipolar ranges. An on-board pacer clock, or an external pacer input, or software polling can trigger A/D conversions. Transfers are via software polling, interrupt service or REP-INSW. A 4096-word FIFO buffer provides buffering between the A/D circuit and the PCMCIA bus.

The PC-CARD-DAS16/12AO provides two single-ended 12-bit analog voltage outputs. The analog output range is software selectable for ±10 V or ±5 V. The selected range applies to both channels.

The four digital I/O bits are available on one 4-bit port. The digital channels are software configurable as four inputs or four outputs, and allow you to sense and control discrete events.

All signals pass through a 50-pin high-density connector. The board is completely plug-and-play, with no switches or jumpers to set.

PC-CARD-DAS16/12AO block diagram

PC-CARD-DAS16/12AO functions are illustrated in the block diagram shown here.

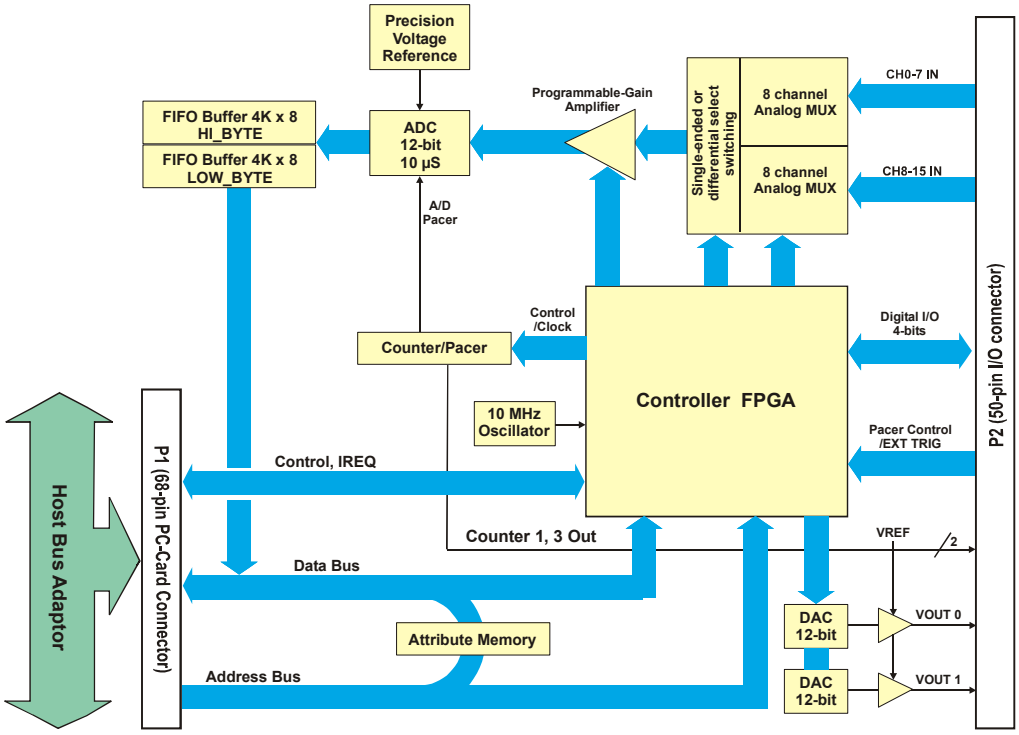


Figure 1. PC-CARD-DAS16/12AO functional block diagram

Software features

For information on the features of *Insta*Cal and the other software included with your PC-CARD-DAS16/12AO, refer to the *Quick Start Guide* that shipped with your device. The *Quick Start Guide* is also available in PDF at www.mccdaq.com/PDFmanuals/DAQ-Software-Quick-Start.pdf.

Check www.mccdaq.com/download.htm for the latest software version.

Installing the PC-CARD-DAS16/12AO

What comes with your PC-CARD-DAS16/12AO shipment?

The following items are shipped with the PC-CARD-DAS16/12AO.

Hardware

- PC-CARD-DAS16/12AO

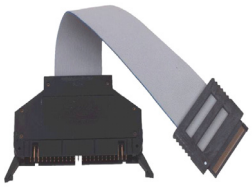
Additional documentation

In addition to this hardware user's guide, you should also receive the *Quick Start Guide* (available in PDF at www.mccdaq.com/PDFmanuals/DAQ-Software-Quick-Start.pdf). This booklet supplies a brief description of the software you received with your PC-CARD-DAS16/12AO and information regarding installation of that software. Please read this booklet completely before installing any software or hardware.

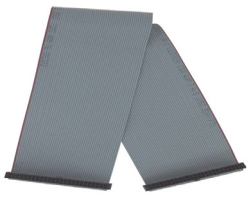
Optional components

- Cables

CPCC-50F-39



CPCC-50M-4



C50FF-x

- Signal termination and conditioning accessories

  MCC provides signal conditioning and termination products for use with the PC-CARD-DAS16/12AO. Refer to Field wiring and signal termination on page 15 for a complete list of compatible accessory products.

Unpacking the PC-CARD-DAS16/12AO

As with any electronic device, you should take care while handling to avoid damage from static electricity. Before removing the PC-CARD-DAS16/12AO from its packaging, ground yourself using a wrist strap or by simply touching the computer chassis or other grounded object to eliminate any stored static charge.

If any components are missing or damaged, notify Measurement Computing Corporation immediately by phone, fax, or e-mail:

- Phone: 508-946-5100 and follow the instructions for reaching Tech Support.
- Fax: 508-946-9500 to the attention of Tech Support
- Email: techsupport@mccdaq.com

Installing the software

Refer to the *Quick Start Guide* for instructions on installing the software on the *Measurement Computing Data Acquisition Software CD*. This booklet is available in PDF at www.mccdaq.com/PDFmanuals/DAQ-Software-Quick-Start.pdf.

Installing the PC-CARD-DAS16/12AO

The PC-CARD-DAS16/12AO board is completely plug-and-play. There are no switches or jumpers to set. To install your board, follow the steps below.

Install the MCC DAQ software before you install your board

The driver needed to run your board is installed with the MCC DAQ software. Therefore, you need to install the MCC DAQ software before you install your board. Refer to the *Quick Start Guide* for instructions on installing the software.

To install your PC-Card, do the following:

- Insert the card into a free PC Card/PCMCIA type II or III slot. The key helps to insure that the cable is inserted in the correct orientation.

  You do not have to turn the computer off. The system is designed for power-on installation. You should hear an insertion beep when you insert the card.

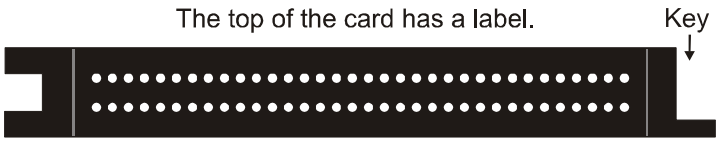


Figure 2. End view of the 50-pin PC-CARD connector showing proper orientation

Windows automatically detects, recognizes, and configures the PC-CARD. You should hear an insertion beep when you insert the card into the slot. To verify that the card is recognized, go to Control Panel\System\Device Manager and the card should now appear under "DAS Component."

If your PCMCIA card is not detected

If the card is not detected by Windows, and you are not prompted for a driver after inserting the card, check that your computer's 32-bit PCMCIA drivers are installed and enabled. Do the following:

1. From your desktop, right-click on My Computer and select **Properties**. The **System Properties** dialog opens.

2. Select the **Hardware** tab and click on the **Device Manager** button.
3. Verify that "PCMCIA adapters" is listed in the Device Manager. If you don't find this entry, or if the properties for the adapter indicate "this device is not working," you need to install or update your PCMCIA adapter drivers.
   - If the PCMCIA adapter is not listed, use the **Add New Hardware Wizard** to install PCMCIA support.
   - If the PCMCIA adapter is listed but not working, use the **Update Driver** option to install the appropriate drivers.

After performing the update procedure, reboot your PC and insert your card again.

Connecting the board for I/O operations

Connectors, cables – I/O connector

The table below lists the board connector, applicable cables, and compatible accessory products.

Board connector, cables, and accessory equipment

Connector type	50-pin connector
Compatible cables	▪ CPCC-50F-39: 50-pin Micro connector to 50-pin female IDC, one-meter cable (39 inches).
	▪ CPCC-50M-4: 50-pin Micro connector to 50-pin male IDC, 4 inch adapter cable. and ▪ C50FF-x: 50-pin IDC female to female cable. x = length in feet.
Compatible accessory products	CIO-MINI50 SCB-50

Pin out – I/O connector

Figure 3 shows a PC-CARD-DAS16/12AO case looking into the male mini-connector. The connector is mechanically keyed to insure that the cable is inserted correctly.

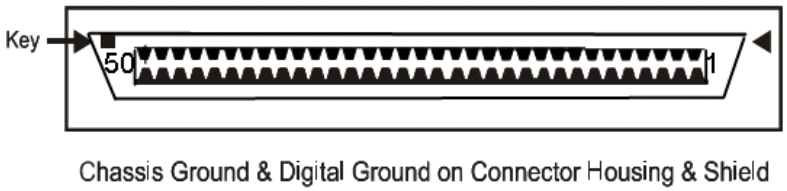


Figure 3. 50-pin I/O mini-connector

Cabling

Measurement Computing offers two cables for connecting the PC-CARD-DAS16/12AO to a screw-type terminal board or other signal conditioning interface board:

- The CPCC-50F-39 cable: 39 inches (990 mm) long; compatible with standard 50-pin screw terminal products.
- The CPCC-50M-4 cable: four-inch long adapter cable; required when using a C50FF-x series cable.

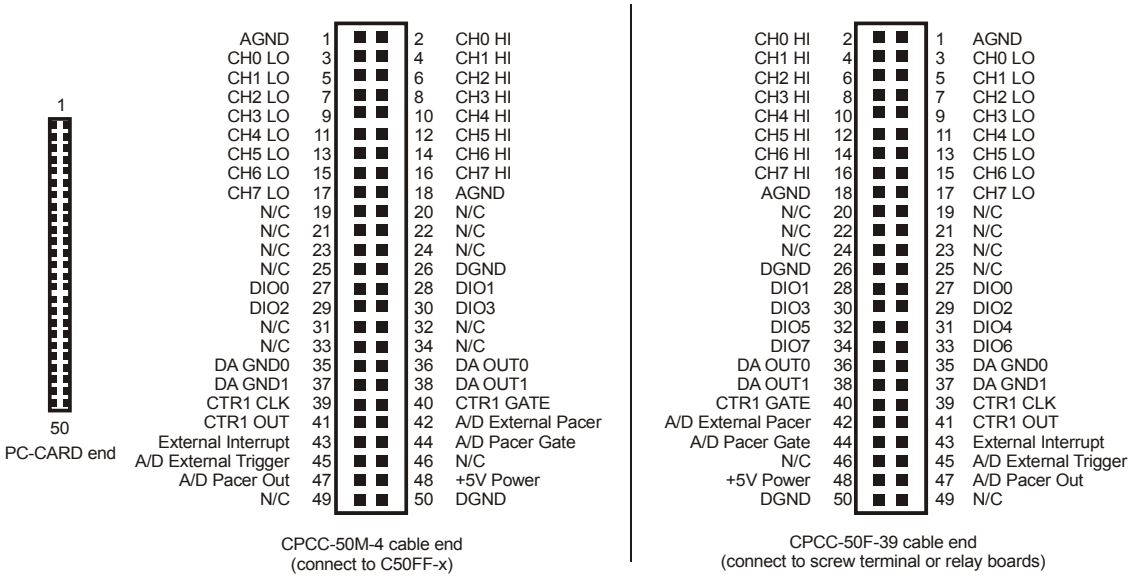


Figure 4. Differential mode cable map — PC-CARD to CPCC-50M-4 and to CPCC-50F-39

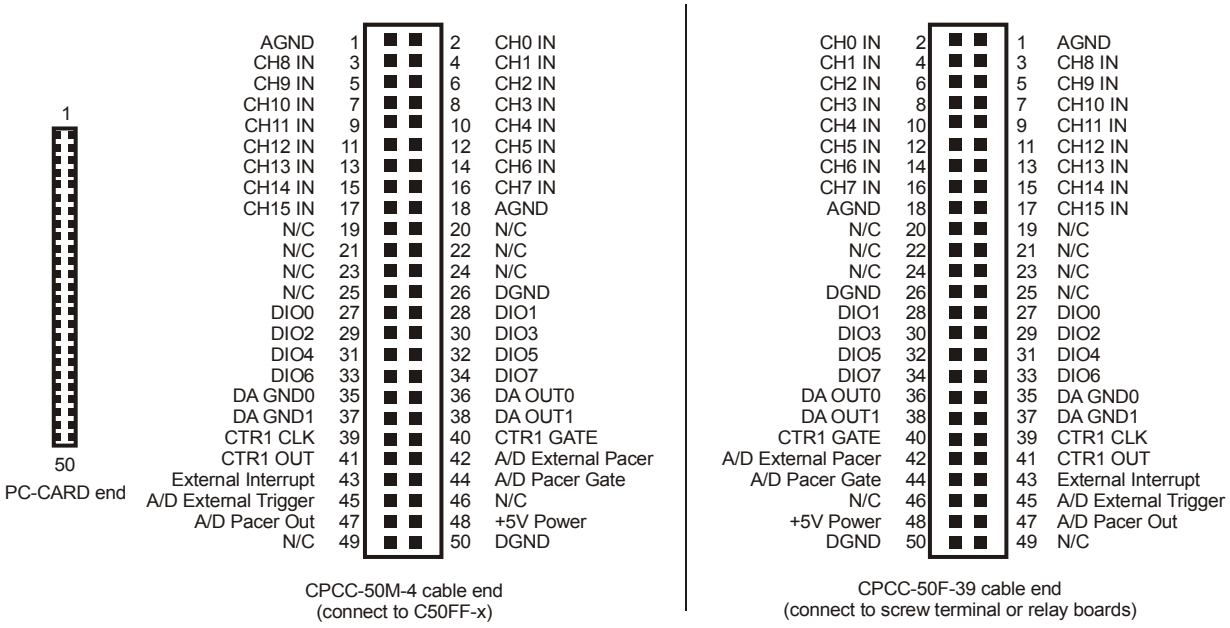


Figure 5. Single-ended mode cable map — PC-CARD to CPCC-50M-4 and to CPCC-50F-39

Note

Digital signals should not be grounded to an analog ground (AGND) pin. Use a digital ground (DGND) pin.

Caution! Do not exceed the input specifications. There are no socketed or user serviceable parts in a PC-CARD-DAS16/12AO. Check the specifications and input voltages *before* connecting any signals.

CPCC-50F-39

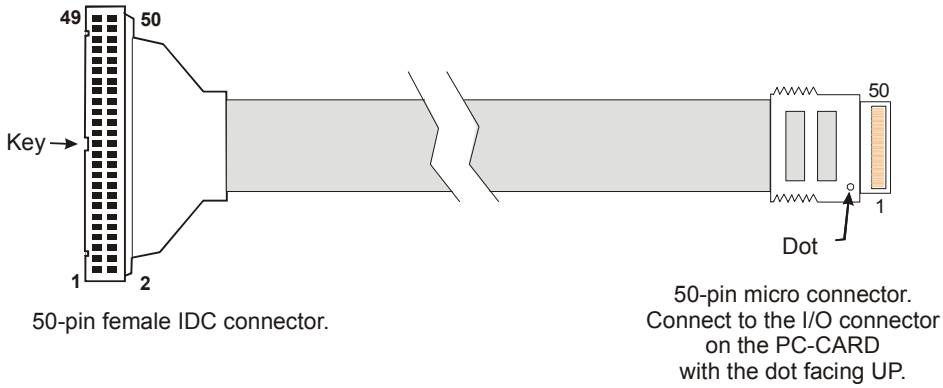


Figure 6. CPCC-50F-39 cable connections

Details on the CPCC-50F-39 cable are available on our web site at www.mccdaq.com/cbicatalog/cbiproduct.asp?dept_id=105&pf_id=1379.

CPCC-50M-4

If your application requires a cable that is longer than one meter in length, use the CPCC-50M-4 four-inch cable, and connect to a C50FF-x cable.

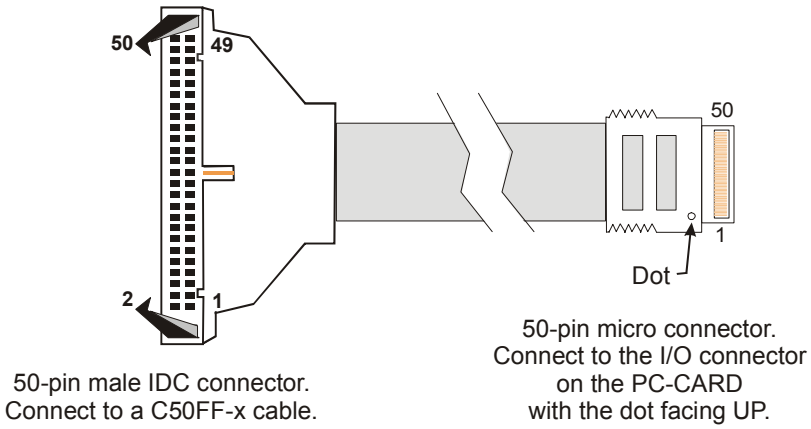


Figure 7. CPCC-50M-4 cable connections

Details on the CPCC-50M-4 cable are available on our web site at www.mccdaq.com/cbicatalog/cbiproduct.asp?dept_id=96&pf_id=1380.

C50FF-x

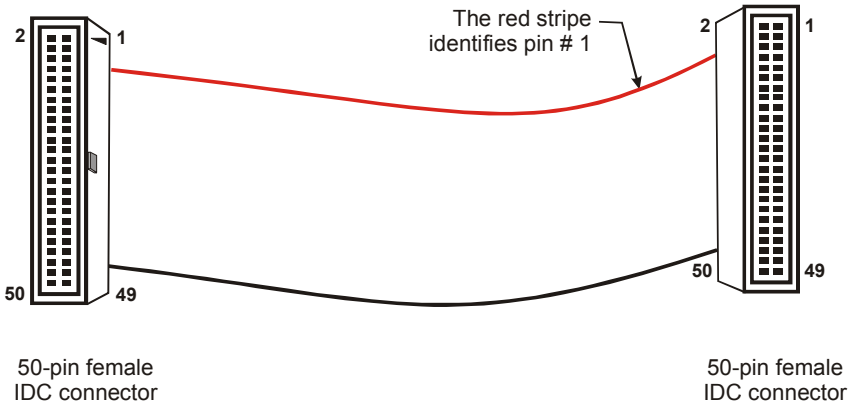


Figure 8. C50FF-x cable

Details on the C50FF-x cable are available on our web site at www.mccdaq.com/cbicatalog/cbiproduct.asp?dept_id=104&pf_id=136.

Field wiring and signal termination

You can use the following cabling, screw termination, and signal conditioning products with the CPCC-50F-39 cable, or with the CPCC-50M-4 and C50FF-x cables:

- CIO-MINI50 – 50-pin screw terminal board. Details on this product are available on our web site at www.mccdaq.com/cbicatalog/cbiproduct.asp?dept_id=102&pf_id=258.
- SCB-50 – 50 conductor, shielded signal connection/screw terminal box provides two independent 50-pin connections. Details on this product are available on our web site at www.mccdaq.com/cbicatalog/cbiproduct.asp?dept_id=196&pf_id=1168.

Information on signal connections

General information regarding signal connection and configuration is available in the *Guide to Signal Connections* (available at www.mccdaq.com/signals/signals.pdf).

Calibrating the PC-CARD-DAS16/12AO

The PC-CARD-DAS16/12AO features auto-calibration with *Insta*Cal. Calibration coefficients for each range are stored on board in nonvolatile RAM. The normal calibration interval is once per year.

Programming and Developing Applications

After following the installation instructions in Chapter 2, your board should now be installed and ready for use. In general there may be no correspondence among registers for different boards. Software written at the register-level for other models does not function correctly with your board.

Programming languages

Measurement Computing's Universal Library provides access to board functions from a variety of Windows programming languages. If you are planning to write programs, or would like to run the example programs for Visual Basic® or any other language, please refer to the *Universal Library User's Guide* (available on our web site at www.mccdaq.com/PDFmanuals/sm-ul-user-guide.pdf).

Packaged applications programs

Many packaged application programs now have drivers for your board. If the package you own does not have drivers for the board, please fax or e-mail the package name and the revision number from the install disks. We will research the package for you and advise how to obtain drivers.

Some application drivers are included with the Universal Library package, but not with the application package. If you have purchased an application package directly from the software vendor, you may need to purchase our Universal Library and drivers. Please contact us by phone, fax or e-mail:

- Phone: 508-946-5100 and follow the instructions for reaching Tech Support.
- Fax: 508-946-9500 to the attention of Tech Support
- Email: techsupport@mccdaq.com

Register-level programming

You should use the Universal Library or one of the packaged application programs mentioned above to control your board. Only experienced programmers should try register-level programming.

Functional Details

The 12-bit A/D converter provides a resolution of 1/4096 parts of full scale. The smallest reading of full scale (1 part in 4096) is called a Least Significant Bit (LSB). Four bipolar and four unipolar ranges may be set by software. These are:

Analog input ranges

Bipolar		Unipolar	
Range	**Resolution**	**Range**	**Resolution**
±10 V	4.88 mV	0 to 10 V	2.44 mV
±5 V	2.44 mV	0 to 5 V	1.22 mV
±2.5 V	1.22 mV	0 to 2.5 V	0.61 mV
±1.25 V	0.61 mV	0 to 1.25 V	305 µV

The input range is controlled by a programmable amplifier.

Conversion speed and amplification

The A/D converter and sample & hold circuit captures and digitizes a signal in 10 µs. The time it takes to complete an A/D conversion remains constant in all conditions and at all throughput rates. When you request a sample rate of say 20 kHz, the A/D converter is still converting the signal in 10 µs. The 20 kHz rate comes from the fact that conversions are being initiated only every 50 µs.

What factors limit conversion speed?

The first is clearly the A/D. A 10 µs conversion speed translates to a maximum throughput of 100 kHz. The second limiting factor can be the analog front end.

The front end may consist of a multiplexer and a programmable gain amplifier. The speed at which these circuits can switch may also limit the throughput of the A/D board. That is, the rate at which it can acquire, convert and transfer a signal with full accuracy. Accuracy is the key term here. The A/D can always run at full speed, but has the front end settled and captured a true, accurate signal?

What about input range vs. speed?

Here is where the design of the analog front end is critical to maintaining total throughput. Most A/D converters have a fixed input range, typically +/-5V. It is the analog front end that amplifies low level signals and adjusts unipolar signals to match the A/D converter's standard input.

A poorly designed analog front end will show up very quickly in the throughput specifications. If you see that an A/D board has high throughput in only one or two ranges but is slowed greatly at all other ranges, you are seeing the practical implications of a poor front end design. The PC-CARD-DAS16/12AO achieves 100 kHz in all of the eight ranges.

Triggering and transfer

A trigger begins an acquisition/transfer cycle. There are three ways to trigger a PC-CARD-DAS16/12AO: programmable pacer, software, or external. The trigger source selection is programmable. The programmable pacer is the product of two 16-bit counters dividing a 10 MHz or 1 MHz pulse derived from a 10 MHz crystal oscillator which can be used to trigger any number of paced conversions. A single conversion can be triggered by software at any time. External trigger, pacer clock and interrupt signals may also be used to control conversions and synchronize to external events.

After a conversion is made, the sample is routed to a 4096-word (sample) FIFO buffer from which it may be retrieved one sample at a time or in blocks via REP-INSW transfers.

How do FIFO size and design affect throughput?

The 4096 12-bit sample FIFO buffer stores samples from the A/D converter as they are being converted. When a block of samples is ready and when the PC is ready, the FIFO is emptied into system memory. Most FIFO designs employ a half-full transfer initiation circuit. When the FIFO is half full, the transfer request is made. Samples continue to fill the second half of the FIFO while the CPU responds to the transfer request and transfers data to system memory.

A/D pacer clock

Many analog acquisitions can be handled by a simple on-board rate divider created by combining a crystal oscillator with a programmable counter. For those, the on-board 82C54 programmable rate generator (counter) supplies the pacing. Some applications require more flexible rate control.

The PC-CARD-DAS16/12AO analog conversions can be externally paced and thereby synchronized with events external to the PC. Conversions can be held off until some external event, such as a not-to-exceed condition is met. Conversions can be externally gated so that samples are taken only when an event of interest is occurring, such as a process going over normal limits.

Figure 9 shows a logic diagram of the A/D pacer clock and counters.

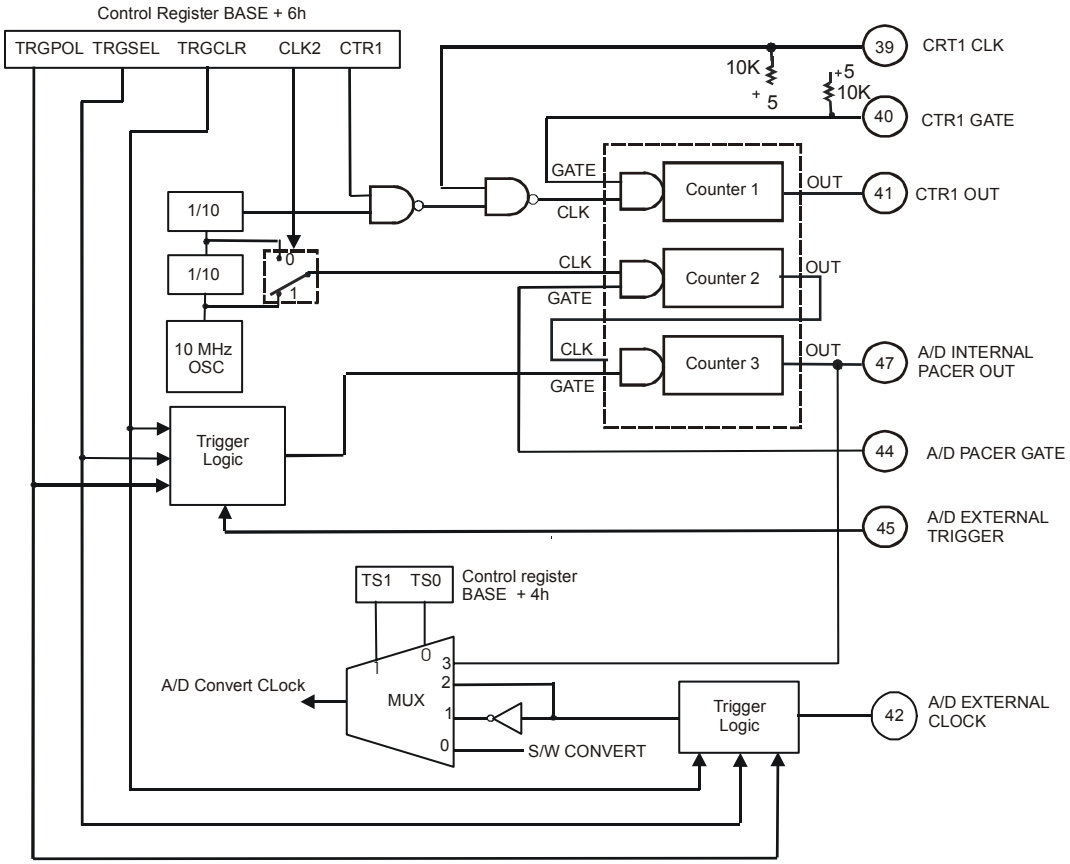


Figure 9. Counter/pacer logic diagram

Specifications

Typical for 25 °C unless otherwise specified.

Specifications in *italic text* are guaranteed by design.

Analog input

Table 1. Analog input specifications

A/D converter type	ADS7804
Resolution	12 bits
Number of channels	16 single-ended / 8 differential, software selectable
Input ranges	±10 V, ±5 V, ±2.5 V, ±1.25 V, 0 to 10 V, 0 to 5 V, 0 to 2.5 V, 0 to 1.25 V, software programmable
A/D pacing (software programmable)	Internal counter - 82C54.
	External source - A/D External Pacer, software programmable for rising or falling edge
	Software polled
A/D trigger sources	External edge trigger (A/D External Trigger)
A/D triggering modes	Rising or falling edge trigger - software selectable
A/D gate sources	A/D External Trigger, gate high or low, software selectable
	A/D Pacer Gate, gate high
Burst mode	Software selectable option, burst rate = 100 kHz
Data transfer	From 4k sample FIFO via REPINSW
	Programmed I/O
A/D conversion time	*10 µs max*
Calibrated throughput	100 kHz
Calibration	Auto-calibration, calibration factors for each range stored on board in nonvolatile RAM

Accuracy

Accuracies are listed for a 100 kHz sampling rate, single channel operation, a 60 minute warm-up, and operational temperatures within ±2 °C of internal calibration temperature. The calibrator test source high side is tied to Channel 0 In and the low side tied to AGND.

Table 2. Absolute accuracy specifications

Range	**Absolute Accuracy**
±10.00 V	±3 LSB max
±5.000 V	±3 LSB max
±2.500 V	±3 LSB max
±1.250 V	±3 LSB max
0 to 10.00 V	±3 LSB max
0 to 5.000 V	±3 LSB max
0 to 2.500 V	±3 LSB max
0 to 1.250 V	±3 LSB max

Each PC-CARD-DAS16/12AO is tested at the factory to assure the board's overall error does not exceed accuracy limits described in Table 2.

Table 3. Calibrated accuracy specifications

Range	Gain Error	Offset Error	DLE (Note 1)	ILE (Note 1)
All ranges	±1.0 max	±1.0 max	±1.0 max	±1.0 max

Note 1: These are the intrinsic specifications of the ADC. Software calibration may introduce a small additional amount of linearity error.

As shown in Table 3, total board error is a combination of gain, offset, differential linearity and integral linearity error. The theoretical worst-case error of the board may be calculated by summing these component errors. Worst case errors are realized only in the unlikely event that each of the component errors are at their maximum level, and causing error in the same direction.

Analog input full-scale gain drift	±0.66 LSB/°C max
Analog input zero drift	±0.61 LSB/°C max
Overall analog input drift	±1.27 LSB/°C max
Common mode range	±10 V min
CMRR @ 60 Hz	-72 dB min
Input leakage current	*±20 nA max*
Input impedance	*10 MOhms min*
Absolute maximum input voltage	*+55/-40 V (Fault Protected via Input Mux)*

Crosstalk

Crosstalk is defined here as the influence of one channel upon another when scanning two channels at the maximum rate. A full scale 100 Hz triangle wave is input on channel 1; channel 0 is tied to analog ground at the connector. The table below summarizes the influence of channel 1 on channel 0 with the effects of noise removed. The residue on channel zero is described in LSB's.

Table 4. Channel to channel crosstalk specifications

Condition	Crosstalk	Per channel Rate	ADC Rate
All ranges	$1LSB_{pk-pk}$	50 kHz	100 kHz

Noise performance

Table 5 summarizes the noise performance for the PC-CARD-DAS16/12AO. Noise distribution is determined by gathering 50 K samples at 100 kHz with inputs tied to ground at the user connector.

Table 5. Noise performance specifications

Range	% within ±2 LSBs	% within ±1 LSB	Typical LSBrms*	Max LSBrms*
0 to 1.250 V	100%	99%	0.61	0.90
All other ranges	100%	100%	0.45	0.75

* RMS noise is defined as the peak-to-peak bin spread divided by 6.6.

Analog output section

Table 6. Analog output specifications

D/A converter type	LTC1446
Resolution	12 bits
Number of channels	2
Configuration	Voltage output, single-ended
Output Range	±10 V, ±5 V. Software selectable. Selected range applies to both channels.
D/A pacing	Software
Data transfer	Programmed I/O
Throughput	System dependent. Using the Universal Library programmed output function (`cbAout`) in a loop in Visual Basic, a typical update rate of 5.5 kHz (±200 Hz) can be expected. The rate was measured on a 600MHz Pentium III based PC.

Accuracy

Table 7. Accuracy specifications

Absolute accuracy	±5.0 LSB worst case error
Differential linearity error	*±0.5 LSB max*

Table 8. Calibrated accuracy components

Gain error	±1.0 LSB max
Offset error	±1.0 LSB max
Integral linearity error	±5.0 LSB max

Each PC-CARD-DAS16/12AO is tested at the factory to assure the board's overall error does not exceed ±5.0 LSB.

Total board error is a combination of gain, offset, integral linearity and differential linearity error. The theoretical worst-case error of the board may be calculated by summing these component errors. Worst case error is realized only in the unlikely event that each of the component errors are at their maximum level, and causing error in the same direction. Although an examination of the chart and a summation of the maximum theoretical errors shows that the board could theoretically exhibit a ±7.5 LSB error, our testing assures this error is never realized in a board that we ship.

Monotonicity	*Guaranteed monotonic over temperature*
Analog output full-scale gain drift	±0.60 LSB/°C max
Analog output zero drift	±0.07 LSB/°C max
Overall analog output drift	±0.67 LSB/°C max
Slew rate	± 0.5 V/µs min
Current drive	±2 mA min
Output short-circuit duration	*Indefinite @ 12 mA*
Output coupling	DC
Output impedance	0.1 ohms max
Miscellaneous	*Double buffered output latches*
	Coding: Inverted Offset Binary: 0 code = +FS, 4095 code = -FS
	Output voltage on power up and reset: +10 V (+FS)

Digital input/output

Table 9. DIO specifications

Digital type	FPGA
Number of I/O	4
Configuration	One port, programmable 4 input / 4 output
Input low voltage	0.8 V max
Input high voltage	2.0 V min
Output low voltage (IOL = 4 mA)	0.32 V max
Output high voltage (IOH = -4 mA)	3.86 V min
Absolute maximum input voltage	*-0.5 V , +5.5 V*
Power-up / reset state	Input mode (high impedance)

Interrupt

Table 10. Interrupt specifications

Interrupts	Programmable: Levels 2 – 15
Interrupt enable	Programmable. Default = disabled.
Interrupt sources	External (External Interrupt)
	A/D End-of-channel-scan
	A/D FIFO-not-empty
	A/D FIFO-half-full
	A/D Pacer

Counter

Table 11. Counter specifications

Counter type	82C54
Configuration	3 down counters, 16 bits each
Counter 1 - User counter	Source: Programmable external (Ctr 1 Clk) or 100kHz internal source
	Gate: Available at connector (Ctr 1 Gate), pulled to logic high via 10K resistor. See Note 2.
	Output: Available at connector (Ctr 1 Out)
Counter 2 - ADC Pacer Lower Divider	Source: Programmable, 1MHz or 10 MHz internal source
	Gate: Available at connector (A/D Pacer Gate), pulled to logic high via 10K resistor.
	Output: Chained to Counter 3 Clock
Counter 3 - ADC Pacer Upper Divider	Source: Counter 2 Output
	Gate: Internal
	Output: Programmable as ADC Pacer clock. Available at user connector (ADC Pacer out)
Clock input frequency	*10 MHz max*
High pulse width (clock input)	*30 ns min*
Low pulse width (clock input)	*50 ns min*
Gate width high	*50 ns min*
Gate width low	*50 ns min*
Input low voltage	*0.8 V max*
Input high voltage	*2.0 V min*
Output low voltage	*0.4 V max*
Output high voltage	*3.0 V min*
Crystal oscillator frequency	10 MHz

Frequency accuracy	50 ppm

Note 2: If you are not driving the gate of User Counter 1, it is strongly recommended that it be connected to +5V (VDD).

Power consumption

Table 12. Power consumption specifications

+5V quiescent	85 mA typical, 125 mA max

Miscellaneous

Table 13. Miscellaneous specifications

+5 Volts	Available at I/O connector (+5V Power)	
	Protected by resettable fuse:	
	Hold current:	350 mA max @ 20 °C still air
	Trip current:	700 mA min @ 20 °C still air
	Trip and recovery time:	*100 mS max*
	On resistance:	1.3 Ohms max

Environmental

Table 14. Environmental specifications

Operating temperature range	0 to 70 °C
Storage temperature range	-40 to 100 °C
Humidity	0 to 95% non-condensing

Mechanical

Table 15. Mechanical specifications

Card dimensions	PCMCIA type II: 85.6 mm (L) x 54.0 mm (W) x 5.0 mm (H)

Connector and pin out

Table 16. Connector specifications

Connector type	50-pin connector
Compatible cables	CPCC-50F-39: 50-pin Micro connector to 50-pin female IDC, one-meter cable (39 inches).
	CPCC-50M-4: 50-pin Micro connector to 50-pin male IDC, 4 inch adapter cable. and C50FF-x: 50-pin IDC female to female cable. x = length in feet.
Compatible accessory products	CIO-MINI50 SCB-50

Table 17. Differential analog input mode pin out

Pin	Signal Name	Pin	Signal Name
1	AGND	26	DGND
2	CH0 HI	27	DIO0
3	CH0 LO	28	DIO1
4	CH1 HI	29	DIO2
5	CH1 LO	30	DIO3
6	CH2 HI	31	N/C
7	CH2 LO	32	N/C
8	CH3 HI	33	N/C
9	CH3 LO	34	N/C
10	CH4 HI	35	DA GND0
11	CH4 LO	36	DA OUT0
12	CH5 HI	37	DA GND1
13	CH5 LO	38	DA OUT1
14	CH6 HI	39	CTR1 CLK
15	CH6 LO	40	CTR1 GATE *
16	CH7 HI	41	CTR1 OUT
17	CH7 LO	42	A/D EXTERNAL PACER
18	AGND	43	EXTERNAL INTERRUPT
19	N/C	44	A/D PACER GATE
20	N/C	45	A/D EXTERNAL TRIGGER
21	N/C	46	N/C
22	N/C	47	A/D PACER OUT
23	N/C	48	VDD +5V POWER OUT
24	N/C	49	N/C
25	N/C	50	DGND

* If you are not driving the gate of User Counter 1, it is strongly recommended that it be connected to +5V (VDD).

Table 18. Single-ended analog input mode pin out

Pin	Signal Name	Pin	Signal Name
1	AGND	26	DGND
2	CH0 IN	27	DIO0
3	CH8 IN	28	DIO1
4	CH1 IN	29	DIO2
5	CH9 IN	30	DIO3
6	CH2 IN	31	N/C
7	CH10 IN	32	N/C
8	CH3 IN	33	N/C
9	CH11 IN	34	N/C
10	CH4 IN	35	DA GND0
11	CH12 IN	36	DA OUT0
12	CH5 IN	37	DA GND1
13	CH13 IN	38	DA OUT1
14	CH6 IN	39	CTR1 CLK
15	CH14 IN	40	CTR1 GATE *
16	CH7 IN	41	CTR1 OUT
17	CH15 IN	42	A/D EXTERNAL PACER
18	AGND	43	EXTERNAL INTERRUPT
19	N/C	44	A/D PACER GATE
20	N/C	45	A/D EXTERNAL TRIGGER
21	N/C	46	N/C
22	N/C	47	A/D PACER OUT
23	N/C	48	VDD +5V POWER OUT
24	N/C	49	N/C
25	N/C	50	DGND

* If you are not driving the gate of User Counter 1, it is strongly recommended that it be connected to +5V (VDD).

CE Declaration of Conformity

Manufacturer: Measurement Computing Corporation
Address: 10 Commerce Way
Suite 1008
Norton, MA 02766
USA

Category: Electrical equipment for measurement, control and laboratory use.

Measurement Computing Corporation declares under sole responsibility that the product

PC-CARD-DAS16/12AO

to which this declaration relates is in conformity with the relevant provisions of the following standards or other documents:

EU EMC Directive 89/336/EEC: Electromagnetic Compatibility, EN 61326 (1997) Amendment 1 (1998)

Emissions: Group 1, Class A

- EN 55011 (1990)/CISPR 11: Radiated and Conducted emissions.

Immunity: EN61326, Annex A

- IEC 1000-4-2 (1995): Electrostatic Discharge immunity, Criteria C.
- IEC 1000-4-3 (1995): Radiated Electromagnetic Field immunity Criteria B.
- IEC 1000-4-4 (1995): Electric Fast Transient Burst immunity Criteria B.
- IEC 1000-4-5 (1995): Surge immunity Criteria A.
- IEC 1000-4-6 (1996): Radio Frequency Common Mode immunity Criteria C.
- IEC 1000-4-11 (1994): Voltage Dip and Interrupt immunity Criteria A.

Tests to IEC 1000-4-8 were not required. The PC cards do not contain components that would be susceptible to magnetic fields.

Declaration of Conformity based on tests conducted by Chomerics Test Services, Woburn, MA 01801, USA in June, 2004. Test records are outlined in Chomerics Test Report #EMI3903.04.

We hereby declare that the equipment specified conforms to the above Directives and Standards.

Carl Haapaoja, Director of Quality Assurance

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